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DESCRIPTION

Sealing strip for a vehicle frame structure

- 5 The invention relates to a sealing strip according to the preamble of claim 1.

Sealing strips of this type are used in the C-pillar region of vehicle structures but also in the region of the roof frames of folding roof covers, hardtops and retractable hardtops. In all cases, a pane which can be moved, in particular pivoted, between an open and a closed position is provided and in the closed condition is in engagement with the sealing elements of this sealing strip, wherein this engagement is released in the open condition and wherein partial engagement is achieved according to the open or pivot position of the pane.

- 15 EP 0 628 439 A1 discloses a comparable sealing strip for a frame structure. The basic body of this sealing strip consists of two L-shaped molded parts which are produced independently of each other, in the assembled state describe a U-shaped structure and can consist of a thermoplastic elastomer. Integrally formed on the respective free ends of this structure are inwardly protruding sealing lips which are intended to lie on both sides against a pane of a motor vehicle door. A connection of the two molded parts is achieved by virtue of the fact that their ends which are remote from the sealing lips are configured in each case in the manner of a tongue and groove connection and can be inserted accordingly one inside the other. The state last referred to can be additionally secured by the use of adhesives or by welding. This sealing strip is intended for accommodation in a frame profile, which has a U-shaped cross-section, of a motor vehicle which accordingly exerts a lateral supporting effect. A sealing strip of this type is intended for use in a planar door structure, the pane of which can be linearly displaced between an open position and a closed position.

A substantially comparable sealing strip which consists of a synthetic material and which is additionally locked within the framework of a tongue and groove connection of the L-shaped molded parts is disclosed in US 5,461,830.

5 In the structural design of the pivoting movement of the pane, it is necessary in dependence upon the respective vehicle design often to observe geometric restrictions which are caused by the wheel case which restricts the space available inside the door construction to receive the pane in the fully open condition. Therefore, in many cases it is necessary to arrange a comparatively complicated pivoting movement of the pane,
10 a situation which must be observed when dimensioning the sealing strips. Sealing strips of this type are regularly formed in such a manner that they serve as a support for two sealing lips which are intended to cover edge regions of the pane in a sealing manner on both sides, wherein the two-dimensional or spatial progression of the sealing strip is to be adapted to the pivoting movement of the pane in order to achieve
15 coverage with the sealing lips which is uniform in the sealing region.

Therefore, in contrast to the prior art set forth in the introduction, the sealing strip which is ready for mounting on a vehicle is a component which is curved in a two-dimensional or spatial manner in dependence upon the specific application and
20 supports two sealing lips.

Within the Applicant's firm, it is known to form this component in one piece, wherein a distinction is made between a basic structure and the sealing lips which are different in terms of materials and wherein in order to improve the sealing properties and to
25 reduce wear the surface portions of the sealing lips which interact with the pane are coated e.g. with an antifriction varnish. Further surface processing can be performed in diverse flocking methods etc.. Since the surfaces which are to be processed are frequently located at points on the sealing strip which are difficult to reach and since elastic deformation is generally required for the purpose of exposing the surfaces
30 which are to be processed, these working operations are frequently difficult to perform

in particular by reason of the spatially curved configuration of the sealing strip in conjunction with the width dimensions which are not constant along this strip. The poor accessibility to these functional surfaces can, in individual cases, lead to reductions in quality in processing and to defects in the end products.

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A single-piece formation of a sealing strip is disclosed e.g. in the aforementioned EP 0 642 943 A1.

Against this background, it is the object of the invention to design a sealing strip of the type described in the introduction which particularly in terms of assembly can be handled in a convenient manner whilst obviating the disadvantages associated with the prior art and whilst retaining a high degree of fitting accuracy and, by adaptation to the respective pivot curve of the pane, permits any insertion depth between the pane and the sealing strip according to variable coverage of the sealing surfaces of the pane, wherein furthermore working processes are to be simplified in the region of functional surfaces. In the case of a sealing strip of this type, this object is achieved by the features of the characterizing part of claim 1.

The sealing strip in accordance with the invention consists of two mutually separate molded parts which can be connected together and extend in a uniform manner from one end to the other end. Both molded parts can be finish-processed prior to assembly, in particular in the region of their functional surfaces and they are only connected together in the end state in order to form the completed sealing strip. In the case of this construction, the molded parts can be constructed with particular consideration given to the importance of manufacturing technology which affects in particular the functional surfaces which require finish-processing, in particular in the form of a coating procedure or other procedure. These finishing procedures can thus be performed unhindered by the structure of the completed sealing strip and furthermore independently of the two-dimensional or spatial curvature of the molded part which is caused by the specific vehicle frame construction and the pivot curve of the pane. Therefore, as a result a sealing strip is provided which by reason of its

structural design is free of processing errors and is characterized, in terms of quality, by faultless processing of its functional surfaces.

5 The sealing strip has a U-shaped cross-section, wherein sealing lips are attached to the free ends of this U-shaped structure and wherein the hollow space which is surrounded by this structure is intended to receive the pane during the pivoting movement thereof starting from the closed position to the open position. This hollow space comprises a configuration which is governed by the pivot curve of the pane and changes in the longitudinal direction of the sealing strip, and said hollow space
10 permits in particular different insertion depths of the pane starting from one end to the other end of the sealing strip. Finally, this hollow space is also curved in a two-dimensional or spatial manner and, in turn, in accordance with the respective vehicle design. At the same time, this basic structure exemplifies the difficulty which would otherwise arise during the processing of functional surfaces within this structure.
15 Functional surfaces are considered in particular to be those surfaces which come into direct contact with edge regions of the pane which is introduced into this structure during the said pivoting movement.

20 The U-shaped configuration of the sealing strip is composed in accordance with the invention of generally L-shaped molded parts which consist, on the one hand, of a mounting portion and, on the one hand, of a side portion, wherein sealing elements which support the sealing lips are attached to the free ends of the mounting portions. Whereas the molded part consists of a synthetic material, the respective sealing element is produced from an elastomer material. Both molded parts can be assembled
25 with their mounting portions to produce a configuration which is rectangular or even square in cross-section, thus forming the structure of the sealing strip which has a U-shaped cross-section. In accordance with the invention, the molded parts which overlap in the assembled state are attached to each other in a positive-locking manner by their mounting portions, wherein in order to produce the attached state it is merely
30 necessary to make the profile elements of one mounting portion engage with the cut-outs of the other mounting portion which can be accomplished by a displacement

movement and wherein the final assembled state can be secured in a frictionally engaged manner or even by mechanical locking. The sealing strip in accordance with the invention arrives at the assembly line in this state, in which the molded parts are attached to each other. It is thus a component which can be handled uniformly.

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In accordance with the features of claim 3, the sealing lips comprise an arcuate configuration and, starting from the free ends of the U-shaped structure, extend inwards in relation to the hollow space defined thereby. Preferably, the sealing lips contact each other when the pane is pivoted out within this hollow space. This means that when the pane is pivoted in, the sealing lips are elastically pivoted as a result of the lips lying against the pane, whereby in dependence upon the extent of the pivoting movement an elastic contact force is applied. By appropriately coating the surfaces of the sealing lips, it is possible in particular to improve their antifriction properties and any occurring wear and friction forces with respect to the pane are reduced. The elastic restoring force of the sealing lips can be influenced in structural terms by the selection of the material but also by local cross-sectional attenuations, notches or the like.

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The features of claims 4 to 6 are directed to exemplary embodiments of the sealing strip in terms of materials. Accordingly, the molded parts can consist e.g. of a glass fiber-reinforced PPE, wherein the sites which are intended for injection molding of sealing elements which can consist e.g. of EPDM are coated with SBR. All of these parts are preferably processed by extrusion, injection molding or transfer molding, therefore substantially within the scope of continuous manufacturing methods, wherein functional surfaces are subjected to finish-processing, in particular a coating procedure. However, the material data is provided merely by way of example and is not to be understood as a limitation thereto. For example, a PPE with a glass fiber proportion of 20% and an EPDM with a Shore A hardness of 50 can be used.

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In accordance with the features of claim 7, functional surfaces of the sealing strip are coated e.g. with an antifriction varnish or flocked.

In accordance with the features of claim 8, the mounting portions of both molded parts
5 are intended in the assembled state to be provided in the surface region with positive locking elements which are brought into engagement during assembly. In essence, these locking elements can actually be configured in any way, as long as a reliable connection, in particular also a locking connection, is provided.

10 It can be appreciated that the sealing strip in accordance with the invention is a product which is configured in particular with regard to the interests of manufacturing and which permits adapted coverings in the sealing region according to the pivot position of a pane, and moreover with adaptation to any two-dimensional or spatial curvatures which are determined by the respective vehicle frame construction, so that
15 corresponding to the pivot angle of the pane, variable insertion depths of the pane into the structure of the sealing strip are permitted.

The invention will be described in detail hereinunder with reference to the exemplified embodiment which is illustrated schematically in the drawings, in which

20 Figures 1 and 2

show in each case perspective illustrations of the mutually adapted molded parts which cooperate with each other within the framework of the sealing strip in accordance with the invention;

NEW CLAIMS

1. Sealing strip (3) which is arranged for mounting on a vehicle frame structure and
5 which is intended to cooperate with a window pane which can be pivoted between an
open and a closed position, having a basic body which comprises an elongated
structure which has a U-shaped cross-section and substantially surrounds a hollow
space (26), wherein a sealing lip (11, 21) is disposed in each case on the free ends of
10 this structure with the proviso that the pane which is introduced on the edge-side into
the hollow space (26) during a pivoting movement comes into abutment on both sides
with a sealing lip, having two molded parts (1, 2) which are produced separately from
one another, can be connected together and in the connected state form the basic body
of the sealing strip (3), wherein both molded parts consist of a synthetic material,
15 comprise a generally L-shaped configuration and consist in each case of a mounting
portion (4, 17) and a side portion (5, 18) which extends preferably perpendicularly
thereto, and that in the mounted state the molded parts (1, 2) overlap in the region of
their mounting portions (4, 17), characterized in that the basic body comprises a
configuration which is two-dimensionally or spatially curved in dependence upon the
20 vehicle frame structure, that, starting from one end (6) towards the other end (7), the
hollow space (26) comprises a changing, in particular a reducing depth corresponding
to a width dimension (8), that profile elements (14, 16), which can be brought into
engagement with cut-outs (22, 23) in the mounting portion (17) in order to attach the
molded parts in a positive-locking manner to each other, are integrally formed on the
mounting portion (4), and that a sealing element (10, 19) which supports a sealing lip
25 (11, 21) and is produced from an elastomer is attached to each free end of the side
portions (5, 18) of the molded parts (1, 2).

2. Sealing strip (3) as claimed in claim 1, characterized in that at least one of the
molded parts (1, 2) comprises a functional surface which is to be coated or processed
30 in another way, and that the functional surface is located within the U-shaped structure
of the hollow space (26).

3. Sealing strip (3) as claimed in claim 1 or 2, characterized in that the sealing lips (11, 21) comprise an arcuate configuration and preferably contact each other within the hollow space (26) when the pane is pivoted out.
- 5 4. Sealing strip (3) as claimed in any one of the preceding claims 1 to 3, characterized in that the molded parts (1, 2) consist of a fiber-reinforced PPE [poly(oxy-(2,6-dimethyl)-1,4-phenylene)].
- 10 5. Sealing strip (3) as claimed in any one of the preceding claims 1 to 4, characterized in that the sealing elements (10, 19) consist of EPDM (ethylene/propylene-diene-copolymer), TPE (thermoplastic elastomer) or the like.
- 15 6. Sealing strip as claimed in any one of claims 1 to 6, characterized in that at least the regions of the molded parts (1, 2) which during production of the sealing elements (10, 19) by injection-molding interact with these sealing elements, are coated with SBR (styrene-butadiene-rubber) or a comparable substance.
- 20 7. Sealing strip (3) as claimed in any one of the preceding claims 2 to 6, characterized in that the said functional surfaces are coated with an antifriction varnish, are flocked or are processed in another way in the surface region.
8. Sealing strip (3) as claimed in any one of the preceding claims 1 to 7, characterized in that in the mounted state the molded parts (1, 2) are connected together via positive locking elements which are formed in these portions.

ABSTRACT

Sealing strip for a vehicle frame structure

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A sealing strip which is arranged for mounting on a vehicle frame structure and which is intended to cooperate with a window pane which can be pivoted between an open and a closed position is characterized by a U-shaped basic body which consists of two L-shaped molded parts (1, 2) which are produced separately from each other, can be
10 connected together and in the connected state form the basic body of the sealing strip, wherein at least one of the molded parts (1, 2) comprises a functional surface which is to be coated or is to be processed in another manner. The basic body has an elongated structure which surrounds a hollow space (26) and whose free ends are provided in each case with a sealing lip (11, 21) which is intended to lie against the pane during
15 the pivoting movement of said pane which is introduced on the edge-side into the hollow space (26). The sealing strip comprises a configuration which is two-dimensionally or spatially curved in dependence upon the vehicle frame structure and, starting from one end towards the other end, the hollow space (26) has a changing depth corresponding to a width dimension (8). As a result of the division into two
20 molded parts (1, 2), it is possible to coat or otherwise process the said functional surfaces in a problem-free manner in particular also with consideration given to the different insertion depths of the pane in the longitudinal direction of the sealing strip.
(Fig. 4)

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